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AQUAfast AQ3140 COD Colorimeter User Guide

Version 1

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ThermoFisher
SCIENTIFIC

Important Information

⚠ CAUTION ⚠

The accuracy of the instrument is only valid if the instrument is used in an environment with controlled electromagnetic disturbances according to DIN 61326. Wireless devices, e.g. wireless phones, must not be used near the instrument.

Important disposal instructions for batteries and accumulators

EC Guideline 2006/66/EC requires users to return all used and worn-out batteries and accumulators. They must not be disposed of in normal domestic waste. Because our products include batteries and accumulators in the delivery package our advice is as follows :

Used batteries and accumulators are not items of domestic waste. They must be disposed of in a proper manner. Your local authority may have a disposal facility; alternatively you can hand them in at any shop selling batteries and accumulators. You can also return them to the company which supplied them to you; the company is obliged to accept them.

Important Information

To Preserve, Protect and Improve the Quality of the Environment

Disposal of Electrical Equipment in the European Union

Because of the European Directive 2012/19/EU your electrical instrument must not be disposed of with normal household waste! Thermo Scientific will dispose of your electrical instrument in a professional and environmentally responsible manner. This service, excluding the cost of transportation is free of charge. This service only applies to electrical instruments purchased after 13th August 2005. Send your electrical Thermo Scientific instruments for disposal freight prepaid to your supplier.

Contents

Special functions - General Notes

Display Backlight

Option

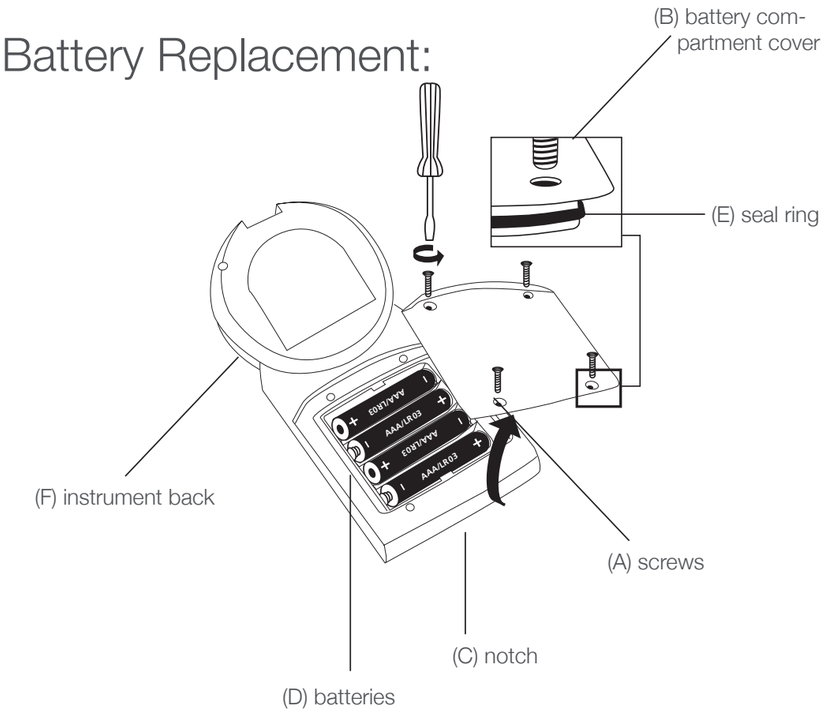
Press the [Option] key to turn the display backlight on or off. The backlight is switched off automatically during the measurement.

Recall of Stored Data

Option

If the instrument is switched on, press the [Option] key for more than 4 seconds to access the recall menu.

Battery Replacement:



CAUTION:

To ensure that the instrument is water proof:

seal ring (E) must be in position

battery compartment cover (B) must be fixed with the four screws

If the batteries are removed for more than one minute the date and time menu starts automatically when the photometer is switched on the next time.

General Notes

Method Notes

- Prior to measurement ensure that the sample is suitable for analysis (no major interferences) and does not require any preparation i.e. pH adjustment, filtration etc.
- Reagents are designed for use in chemical analysis only and should be kept well out of the reach of children.
- Ensure proper disposal of reagent solutions.
- Safety Data Sheets are available on request.

Chemical method notes:

Method:

The organic material present in the sample is oxidised by a standard amount of a potassium dichromate oxidising mixture. After oxidation is complete, the excess of this reagent is measured photometrically.

Application:

Samples can be measured if the chloride content does not exceed 1 000 mg/l (LR/MR) or 10 000 mg/l (HR).

In exceptional cases, compounds contained in the water cannot be oxidized adequate. This results in minimum findings, compared with the reference method.

Different methods of sampling, preparation of the sample itself and the time elapsed between taking the sample and analysis can all affect the obtained results.

Guidelines for photometric measurements

1. Run samples and blanks with the same batch of vials.
   The blank is stable when stored in the dark and can be used for further measurements with vials from the same batch.
2. Don't place hot vials in the adapter. Allow the vials to cool to room temperature for minimum 45 minutes. It is recommended to leave the vials to cool over night.
3. Suspended solids in the vial lead to incorrect measurements. For this reason it is important to place the vials carefully in the adapter. The precipitant at the bottom of the sample should not be suspended.
4. Clean the outside of the vials with a towel to remove fingerprints or other marks.
5. Avoid spillage of water or reagent solution into the sample chamber because this can lead to incorrect test results.
6. Contamination of the transparent cell chamber can result in wrong readings. Check at regular intervals and – if necessary – clean the transparent cell chamber using a moist cloth or cotton buds.
7. Large temperature differences between the instrument and the environment can lead to errors – e.g. due to the formation of condensation in the cell chamber or on the vial.
8. To avoid errors caused by stray light do not use the instrument in bright sunlight.

Methods

COD

Select the appropriate vial for the desired range:

Reagent	Quantity	Cat. No.
COD LR 0 - 150 mg/l	25 CT 150 CT	CODL00 CODL150
COD MR 0 - 1500 mg/l	25 CT 150 CT	CODH00 CODM150
COD HR 0 - 15000 mg/l	25 CT 150 CT	CODHP0 CODH150

Preparing the Sample

Open a reaction vial with a white cap and add the specified volume.
(Ensure that appropriate personnel safety equipment is used.)

LR/MR: 2 ml water sample
HR: 0.2 ml water sample

Prepare a blank (Note 1) by using deionised water (TOC-free) instead of the sample (LR/MR: 2 ml, HR: 0.2 ml).
Replace the cap tightly. Invert the vial gently several times to mix the contents (**Caution:** The vial will become hot during mixing!) and digest the vials for 120 minutes in the reactor at a temperature of 150 °C. Remove the vials from the reactor and allow them to cool down to 60 °C or less. Mix the contents by inverting each vial several times while still warm. Then allow the vials to cool to ambient temperature before measuring.

Measurement

Fix the adapter for 16 mm vials on the sample chamber.

On / Off

Switch the unit on using the [ON/OFF] key.

The display shows the following: Lr (low range), Mr (medium range) or Hr (high range)

Mode

Select the required test using the [MODE] key.

Scroll Memory (SM)

To avoid unnecessary scrolling for the required test range, the instrument memorizes the last range used before being switched off. When the instrument is switched on again, the scroll list comes up with the last used test range first.

The display shows the following: Lr, Mr or Hr

Methods

Place the blank in the adapter (Note 1–4) making sure that the marks Δ Δ are aligned.
Blanks are specially prepared for each individual test range.
Press the [ZERO/TEST] key.

Zero / Test

The "Lr, Mr or Hr" symbol flashes for approx. 8 seconds.

The display shows the following: 0.0.0

After zeroing remove the vial from the adapter.

Place the sample in the adapter (Note 2–4) making sure that the marks Δ Δ are aligned.

Zero / Test

Press the [ZERO/TEST] key.

The "Lr, Mr or Hr" symbol flashes for approx. 3 seconds.

The result appears in the display.

LR-/MR-range: in mg/l
HR-range: in g/l

The result is saved automatically.

Tolerance: ± 3.5 % (full scale)

Zero / Test

Repeating the test:
Press the [ZERO/TEST] key again.

Zero / Test

New zero calibration:
Press the [ZERO/TEST] key for 2 seconds.

Menu options

Menu Selections

Mode / On Off / Option

Switch the unit off

Press the [MODE] key and hold.

Switch the unit on using the [ON/OFF] key.
Allow the 3 decimal points to be displayed before releasing the [MODE] key.

The [Option] key allows for selection of the following menu points:

diS recall stored data

dAtE setting the date and time

CAL user calibration

diS

diS – Recall of Stored Data

Mode

After confirming the selection with the [MODE] key the photometer shows the last 16 data sets in the following format (automatically proceeds every 3 seconds until result is displayed):

Number	n xx (xx: 16...1)
Year	YYYY (e.g. 2014)
Date	mm.dd (monthmonth:dayday)
Time	hh:mm (hourhour:minuteminute)
Test	Method
Result	x,xx

Zero Test

The [ZERO/TEST] key repeats the current data set.

Mode

The [MODE] key scrolls through all stored data sets.

Option

Quit the menu by pressing [Option] key.

dAtE

Setting Date and Time (24-hour-format)

Mode

After confirming the selection with the [MODE] key the value to be edited will be shown for 2 sec.

SET
DATE
YYYY
(2 sec.)

The setting starts with the year (YYYY) followed by the actual value to be edited. The same applies for month (mm), day (dd), hour (hh) and minutes (mm). Set the minutes first in steps of 10, press the [Option] key to continue setting the minutes in steps of 1.

Mode

Increase the value by pressing the [MODE] key.

Zero Test

Decrease the value by pressing [ZERO/TEST] key.

Option

Proceed to the next value to be edited by pressing [Option] key.

After setting the minutes and pressing the [Option] key the display will show “IS SET” and the instrument returns to the measurement mode.

Menu options - Calibration Mode

Cal CAL

CAL – User Calibration

Note:

cAL user calibration (Display in calibration mode)

CAL factory calibration (Display in calibration mode)

CAL

After confirming the selection with the [MODE] key the instrument will show CAL/"Method".

METHOD

Scroll through methods using the [MODE] key.

Fill a clean vial with the standard up to the 10 ml mark, screw the cap on and place the vial in the sample chamber making sure that the ⍙ marks are aligned.

Zero Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 8 seconds.

0.0.0

CAL

The display shows the following in alternating mode:

Perform calibration with a standard of known concentration (see "Operation").

Zero Test

Press the [ZERO/TEST] key.

METHOD

The method symbol flashes for approx. 3 seconds.

RESULT

CAL

The result is shown in the display, alternating with CAL.

If the reading corresponds with the value of the calibration standard (within the specified tolerance), exit calibration mode by pressing the [ON/OFF] key.

Changing the displayed value:

Mode

Pressing the [MODE] key once increases the displayed value by 1 digit.

Zero Test

Pressing the [ZERO/TEST] key once decreases the displayed value by 1 digit.

CAL

RESULT + x

Press the corresponding key until the reading equals the value of the calibration standard.

On Off

By pressing the [ON/OFF] key, the new correction factor is calculated and stored in the user calibration software.

: :

Confirmation of calibration (3 seconds).

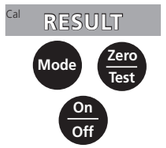
Note: The instrument calibration in the range MR is automatically taken also for HR.

Calibration Mode

Factory Calibration Reset

Resetting the user calibration to the original factory calibration will reset all methods and ranges.

A user calibrated method is indicated by a "Cal" symbol while the test result is displayed.



To reset the calibration press both the [MODE] and [ZERO/TEST] key and **hold**.

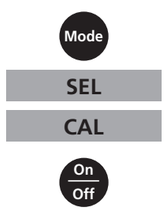
Switch the unit on using the [ON/OFF] key.
Release the [MODE] and [ZERO/TEST] keys after approx. 1 second.

The following messages will appear in turn on the display:

The factory setting is active.
(SEL stands for Select)

or:

Calibration has been set by the user.
(If the user calibration is to be retained, switch the unit off using the [ON/OFF] key).



Calibration is reset to the factory setting by pressing the [MODE] key.

The following messages will appear in turn on the display:

Switch the unit off using the [ON/OFF] key.

Technical Data

Technical Data

Instrument	double wavelength, automatic wavelength selection, direct reading colorimeter
Light source:	LEDs, interference filters (IF) and photosensor in transparent cell chamber. Wavelength specifications of the IF: 430 nm $\Delta\lambda$ = 5 nm 610 nm $\Delta\lambda$ = 6 nm
Wavelength accuracy	± 1 nm
Photometric accuracy*	3% FS (T = 20° C – 25° C)
Photometric resolution	0.01 A
Power supply	4 batteries (AAA/LR 03)
Operating time	17hr operating time or 5000 test measurements in continuous mode when display backlight is off
Auto-OFF	automatic switch off 10 minutes after last keypress
Display	backlit LCD (on keypress)
Storage	internal ring memory for 16 data sets
Time	real time clock und date
Calibration	user and factory calibration resetting to factory calibration possible
Dimensions	155 x 75 x 35 mm (LxWxH)
Weight	approx. 260 g (incl. batteries)
Ambient conditions	temperature: 5–40°C rel. humidity: 30–90% (non-condensing)
Waterproof	as defined in IP 67
CE	Certificate for Declaration of CE-Conformity

*measured with standard solutions

To ensure maximum accuracy of test results, always use the reagent systems supplied by the instrument manufacturer.

Operating Messages - Error Codes

Operating Messages

Hı	Measuring range exceeded or excessive turbidity.
Lo	Result below the lowest limit of the measuring range.
	Replace batteries, no further tests possible.
btLo	Battery capacity is too low for the display backlight; measurement is still possible.
	A user calibrated method is indicated by a "Cal" symbol while the test result is displayed. (see "Factory calibration reset").

Error Codes

E27 / E28 / E29	Light absorption too great. Reasons: e.g. dirty optics.
E 10 / E 11	Calibration factor "out of range"
E 20 / E 21	Too much light reaching the detector.
E23 / E24 / E25	
E 22	Battery capacity was too low during measurement. Change battery.

E 70	LR:	Factory calibration incorrect / erased
E 71	LR:	User calibration incorrect / erased
E 72	HR:	Factory calibration incorrect / erased
E 73	HR:	User calibration incorrect / erased

Technical Support

For any questions or if you require assistance, contact our Technical Support Specialists:

- Email wai.techservbev@thermofisher.com
- Within the United States, call 1-800-225-1480
- Outside the United States, call +1-978-232-6000 or fax +1-978-232-6031

For additional product information, contact your local authorized dealer, Thermo Scientific Orion technical sales representative or contact us using the Water and Laboratory Products (WLP) information on the back page of this user manual.

Ordering Information

AQ3140	Orion AQUAfast COD colorimeter with field case, batteries and literature
CODL00	Orion AQUAfast COD low range 0-150 mg/l digestion tubes, 25 tests
CODL150	Orion AQUAfast COD low range 0-150 mg/l digestion tubes, 150 tests
CODH00	Orion AQUAfast COD medium range 0-1500 mg/l digestion tubes, 25 tests
CODM150	Orion AQUAfast COD medium range 0-1500 mg/l digestion tubes, 150 tests
CODHP0	Orion AQUAfast COD high range 0-15000 mg/l digestion tubes, 25 tests
CODH150	Orion AQUAfast COD high range 0-15000 mg/l digestion tubes, 150 tests
COD165	Orion AQUAfast thermoreactor for digestion methods, selectable 100, 120, 150, 160 and 165°C temperature control settings
CODS01	Orion AQUAfast 1000 mg/l COD standard, 475 mL
CODS10	Orion AQUAfast 10000 mg/l COD standard, 475 mL

Find out more at **thermofisher.com/water**

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